

Zero Retries issue 0226 2025-10-31

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3200+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Email - editor@zeroretries.net

On the web: <https://www.zeroretries.org/p/zero-retries>

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Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Peter Neubauer KD0QXJ** for *renewing* as an **Annual Paid Subscriber (3rd year!)** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 104** for becoming a **Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Radio Technology is Evolving Fast, Especially Open Source

I was “surfing” the YouTube videos from the recently concluded AMSAT-US 43rd AMSAT Space Symposium and Annual General Meeting - [Day 1](#), [Day 2](#). One discussion got my attention - the planned use of a 10 GHz downlink on a Low Earth Orbit (LEO) microsat. A big challenge in using (Amateur Radio) 10 GHz from LEO is for an Amateur Radio ground station to keep a 10 GHz antenna aimed at the fast moving satellite. It's (I think...) inherent that a directional antenna for 10 GHz has a much more narrow beam width than a directional antenna for lower Amateur Radio bands such as 420-450 MHz. Thus the aiming mechanism must be more precise and responsive than for lower frequency antennas.

I immediately thought of the [open.space](#) phased array antenna system that I saw at Pacificon 2025. That particular unit / system is designed for C-band - 4.9–6 GHz, but otherwise it's exactly what AMSAT described as needed for a microwave downlink from LEO - an electronically steered (with perhaps some assistance from azimuth / elevation rotors) phased array antenna.

Thus with the “ground segment handled” by the open.space system, perhaps it's appropriate to adjust the plans of the AMSAT microsat to use 5 GHz for the downlink instead of 10 GHz? The argument for doing so is that a 10 GHz phased array antenna array for a ground station is currently unobtainium, especially at Amateur Radio price points. In contrast, open.space recognized that radio chipsets for 5 GHz are commodity items (even available on very inexpensive microcontrollers).

I wasn't surprised to learn that open.space was founded by a former Space X Starlink engineer familiar with the phased array antenna systems used on Starlink satellites and consumer ground terminals.

FreeDV “Oughta” Have a Data Option

One of the highlights of Pacificon 2025 for me was Bruce Perens K6BP inviting me out to lunch, along with David Rowe VK5DGR and Mooneer Salem K6AQ. VK5DGR and K6AQ are the primary developers on the FreeDV Project, and most recently, the new [Radio Autoencoder \(RADE\)](#) in the newest versions of FreeDV. RADE uses Machine Learning (as opposed to previous versions of FreeDV that used algorithms for digitizing speech).

The four of us had a delightful, casual lunch (Thanks Again, Bruce!), but I wasn't going to miss the opportunity to make one of my primary “pitches” for future features of FreeDV - an option to use FreeDV for data, not just voice.

I cited the example of FreeDATA which uses (pre-RADE) FreeDV's OFDM modulation but adapted for data rather than digitized voice. VK5DGR works with FreeDATA's developer to assist the development of FreeDATA.

But FreeDATA and FreeDV are completely separate applications, despite the common framework of the FreeDV modulation.

I tried to make the case that these two separate apps don't make sense to me. To me, choice of transmitting data, or voice, should simply be whether you press the Enter key on your keyboard, or press the Push To Talk button on your microphone.

Given that there has continued to be the separation of FreeDV and FreeDATA, even with the “enablement” of a 2023 ARDC grant to continue development of FreeDV, I expected to have to press my case with VK5DGR and K6AQ.

However, VK5DGR agreed with me that such a combination of voice and data in FreeDV is feasible, and perhaps desirable. But, a “tight integration” of data into FreeDV / RADE isn’t currently in the development plan submitted for the current ARDC grant. Further, neither he (VK5DGR) nor K6AQ had the skills, or the available development bandwidth, to integrate a data capability into FreeDV / RADE.

That... is a reasonable explanation of why there won’t be an integrated data option in FreeDV / RADE in the near future. Perhaps a future ARDC grant can add such a capability / integrate the capabilities of FreeDATA directly into FreeDV / RADE. This seems reasonable and feasible given that the current work on FreeDV is well documented and open source.

Happy Halloween (Treat!) - ZRDC 2025 Material Now Available

Most of the material from ZRDC 2025 is now publicly accessible on the Zero Retries Digital Conference 2025 Archive page. There are many rough edges on this page, and a number of lingering to-dos (such as photos), and I didn’t get the videos uploaded to the (to be created) Zero Retries YouTube page. But it’s good enough to make public now.

What is there are the videos, the slide decks, the full Proceedings, and the three papers that were submitted.

Weekends Are For Amateur Radio!

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

I have a new 12 volt standby battery power system to install!

Steve N8GNJ

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Full Article by the LinHT Developers:

LinHT: An Open-source SDR Handheld Radio for Amateur Radio Operators

By Andreas Schmidberger OE3ANC, Wojciech Kaczmarek SP5WWP, and Vlastimil Slinták OK5VAS





Cover of the November, 2025 issue of CQ-DL magazine, highlighting the LinHT image courtesy of DARC

Editor's Note: Until very recently, I have been referring to the expansion of "LinHT" as Linux Handie Talkie, which is incorrect. The correct expansion of LinHT is:
Linux Handheld Transceiver.

Below is the article - **LinHT: An Open-Source SDR Handheld Radio for Amateur Radio Operators** previously referenced in Zero Retries 0225, as submitted CQ-DL magazine by the three authors, and published in the November, 2025 issue. Note the article, as submitted, was written in German - this version is a translation to English.

This republication is not an excerpt from the pages of CQ-DL 2025-11.

This article is republished in Zero Retries with the permission of the three authors of the article to promote the [LinHT project](#), which is one of the projects undertaken by volunteers of the [M17 Project](#), sponsored by [M17 Foundation](#).



LinHT: An Open-Source SDR Handheld Radio for Amateur Radio Operators

4.97MB · PDF file

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English version. As submitted to CQ-DL magazine for the November, 2025 issue. Authors: Andreas Schmidberger OE3ANC Wojciech Kaczmarek

SP5WWP Vlastimil Slintak OK5VAS

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While the article is a good explanation of the current state of the LinHT project, some additional detail is offered in SP5WWP's slide deck for his LinHT presentation - [LinHT – a GNU Radio configurable handheld transceiver](#) at M17 Conference 2025 on 2025-09-06 (PDF version):



M17 Con 2025 LinHT

3.24MB · PDF file

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Presentation on LinHT (Linux Handheld Transceiver) at M17 Conference 2025 (2025-09-06). Wojciech Kaczmarek SP5WWP

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The video of SP5WWP's presentation on LinHT at M17 Conference 2025 is now available:

Lastly, one of the author / developers - Vlastimil Slinták OK5VAS offers their insights on the ongoing development of the LinHT in their blog - [µArt.cz](#).

Taken together, the article, slide deck, video of the presentation, and blog provides a good overview of the LinHT project and its progress as of late October, 2025.

Post Publication Update: *LinHT at OpenAlt 2025*

At OpenAlt 2025 on 2025-11-02, Vlastimil Slinták OK5VAS did a presentation on LinHT - [LinHT: open-source SDR transceiver](#). The slides are in English, but the narration is in Czech, but I found that YouTube's auto-translate captioning worked well.

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MESHCON 2025 is a Wakeup Call to Amateur Radio for Relevance With Techies Interested in Radio Technology

By Steve Stroh N8GNJ

[MESHCON 2025](#) isn't quite a fully independent conference devoted to Meshtastic (and MeshCore, and Reticulum - which I'll call collectively call "Meshtastic, etc.") but it's pretty close to one. And its existence of such a focused conference should be a wakeup call to Amateur Radio's leaders because mindshare among techies interested in radio technology is shifting away from Amateur Radio.

MESHCON 2025 is a one day conference, on a Friday, organized by [SpecFive](#), a manufacturer of mesh networking units for commercial and government (rather than hobbyist) users, some of their units incorporating Meshtastic.

But wow... an entire conference / day devoted to *one* mode? That would be like the entire Zero Retries Digital Conference being devoted to AREDN or M17. (*Oh, wait*, that was actually done with the recently concluded [M17 Conference](#)).

[MESHCON 2025 Videos on YouTube](#)

Meshtastic, etc. now has phenomenal penetration amongst techies that are at least mildly interested in radio technology.

It's been said that Meshtastic, etc. is a "gateway drug to Amateur Radio". I (somewhat smugly) agreed with that statement when I first heard it in 2025.

But I'm not so smug now, and no longer certain that Amateur Radio is going to be able to interest Meshtastic, etc. and more generally, mesh networking operating on unlicensed bands.

Consider:

- Meshtastic, etc. is now *well* represented at *every* technology conference, especially those targeted at non-professionals and hobbyists, such as Open Sauce and many others.
- One of the most appealing aspects of Meshtastic, etc. is that it can be used mobile / pedestrian. The units are lightweight, portable, battery powered. There's very little equivalent in Amateur Radio technology for portable data communication devices.
- It's easy and inexpensive to get involved in Meshtastic, etc., especially in being able to purchase low cost equipment.
- To get involved in Meshtastic, etc. there is ample infrastructure available and waiting new users to just "connect up".
- There are now Meshtastic, etc. organizations in many urban areas and regions. Example - [Meshtastic Bay Area Group](#).
- Meshtastic, etc.'s core technology, Semtech's implementation of Chirp Spread Spectrum (CSS) - LoRa - is a very robust modulation, marrying long range capability at low transmitted power.
- While it hasn't been widely used for Meshtastic, etc., there is a more robust infrastructure option (than the current digipeater network architecture) that could be used - [LoRaWAN](#).
- To get involved in Meshtastic etc., there are ample learning resources available - videos, web pages, tutorials, vendor information, local user groups, etc. Note these two YouTube videos posted just in the last few days - [This Really Is CB Radio For The Modern Era!!!](#) and [Can Meshtastic Replace APRS? The Ultimate Showdown!](#)
- Meshtastic, etc. has multiple well-developed and well-maintained free apps to make the experience of using Meshtastic, etc. more pleasant than small displays and constrained keyboards on portable devices.

- Meshtastic, etc. is quickly evolving and improving. When techies want to get involved in improving Meshtastic, etc. there are ample opportunities to do so.
- Despite Amateur Radio's generally better knowledge of the fundamentals and vagaries of radio technology, Meshtastic, etc. is increasingly filling those gaps with explaining radio technology fundamentals, like various types of antennas, propagation, etc.
- Meshtastic, etc. almost entirely operates on unlicensed spectrum, thus no hassles with obtaining learning arcane things for an Amateur Radio test, taking the test, battling the FCC or equivalent to get a license (and in the US, pay \$35 for the privilege).
- Although not Meshtastic (which is a layer operating on LoRa), even satellite communications can be done, as a hobbyist, without an Amateur Radio license thanks to LoRa and the [TinyGS](#) project.
- Because Meshtastic, etc. isn't operating in Amateur Radio spectrum, there are no hassles about using encryption, commercial use, interconnection with Internet, etc.
- Most Meshtastic, etc. users seem to be young, or at least younger than the typical demographic of Amateur Radio.
- I haven't seen any information / promotion of Meshtastic that wasn't completely publicly available. There are no "Meshtastic, etc." paywalls for basic information such as books, magazines, organizations. If you're interested in Meshtastic, etc. you can find more open information than you can easily consume.
- All available information about Meshtastic, etc. is relatively new and current. When information about Meshtastic, etc. is out of date, it's only out of date by a few months or at most a year, perhaps two. Certainly not decades, as is often the case with much information about Amateur Radio available on the web.
- The Meshtastic, etc. community is well-connected and has now proven that it quickly mobilize to meet threats or opportunities. This was amply demonstrated in commenting on NextNet's proposed reconfiguration of the 902-928 MHz band in the US ([FCC WT Docket No. 24-240](#)).
- Meshtastic, etc. users consider Meshtastic, etc. to be an emergency communications capability, both wide area and personal.
- Meshtastic, etc. is improving and growing exponentially. The last time we saw something comparable in Amateur Radio was the *Packet Radio Revolution* beginning in the early 1980s.
- Most profoundly, in comparison to Amateur Radio, Meshtastic, etc. is considered *relevant... current... interesting... cool*. The most common response when Amateur Radio is mentioned to someone with no previous exposure to it... "Oh, is Ham Radio *still a thing?*"

By comparison, Amateur Radio is often perceived as old, tired, and much of the information available from casual web browsing is comparatively stale. Information about anything in Amateur Radio that's comparable to Meshtastic, etc. is very hard to find without knowing what, specifically, to look for.

- **APRS?** Nope - Just from the technology aspect (versus LoRa), it's not even in the same league as Meshtastic, etc., even APRS messaging. And the core capability of APRS - sharing location information, is built into Meshtastic, etc.
- **Packet Radio?** Also not in the same league, mostly stuck in 1200 bps AX.25 AFSK even when packet radio capability is built in to portable radios and made more usable with nice apps like [Packet Commander](#). Even applying Forward Error Correction is a huge battle against decades of inertia to continue using 1200 bps AX.25 AFSK without FEC.
- **CATS?** Better technology than APRS, and in some ways comparable to Meshtastic, etc. But, there are vanishingly few people that know about it, and it isn't getting promoted by anyone besides its creator and here in Zero Retries.
- **IP400?** Just getting started, and it's not being promoted very effectively.
- **LinHT?** Very promising given it could be a "do anything" portable radio that can run GNU Radio flowgraphs. But it's still in the prototype / development stage, with no firm plan for it to become generally available.
- **SuperPeaters?** I can envision SuperPeaters being vastly better infrastructure for an Amateur Radio alternative to Meshtastic, etc. But from what I'm observing, 99.9% of the owners of repeater currently online would rather see their repeaters sit quiet and unused rather than convert them to vastly more useful and capable SuperPeaters.

Why Does This Exponentially Improving Success of Meshtastic, etc. Matter?

- Remember the 11m Amateur Radio band? *Now Citizens Band*.
- Remember the 220-220 MHz portion of the 1.25m band? *Now commercial use (however poorly)*.
- Remember the Amateur Radio exclusive portions of the 3.5 GHz and 5 GHz bands? *Now unlicensed or commercial use*.
- In the next few years, Amateur Radio is going to lose much of the utility of its secondary priority in the 1240-1300 MHz band because of increasing use of it by the primary application for that band worldwide - non-US Global Navigation Satellite Systems (GNSS). Those systems consider most types of Amateur Radio operation to be incompatible with GNSS operations - mostly because Amateur Radio can transmit at high power in this band. But given the popularity of Meshtastic, etc. worldwide, and that Meshtastic, etc. hardware is universally low transmit power, regulators allowing techies to experiment with low power Meshtastic, etc. in 1240-1300 MHz might be tempting.

Thus there's ample precedent for some (well organized) individual, or organization, or company, or regulator to propose reallocation of Amateur Radio exclusive or shared spectrum... or begin sharing of currently exclusive or semi-exclusive Amateur Radio portions of spectrum. Again, as a precedent, in the US, there's 100% overlap of the 902-928 MHz band between unlicensed use and Amateur Radio use. The only substantive difference between unlicensed and Amateur Radio operation in that band is that Amateur Radio can transmit at higher power levels than unlicensed use. But operating as Amateur Radio on 902-928 MHz...

- Encryption cannot be used,

- “Commercial” use (however ill-defined that is) is not permitted,
- “Broadcasting” is not permitted,
- Callsigns must be used,
- You must have an Amateur Radio license, with all the other myriad restrictions inherent with that.

To use Meshtastic on 902-928 MHz as unlicensed... “just go have fun”.

Which sounds more interesting to you? Which do you think sounds more appealing to an average techie who’s curious about experimenting with radio technology?

In Meshtastic, etc. on unlicensed spectrum “versus” Amateur Radio, my opinion is beginning to shift that perhaps there isn’t a good response by Amateur Radio to the momentum of Meshtastic, etc. operating on unlicensed spectrum - and having lots of fun doing so.

Perhaps the only effective response by Amateur Radio is...

*If you can’t beat ‘em...**join ‘em.***

As in get some Meshtastic gear operating on (low power) unlicensed rules, and join in the fun with Meshtastic, etc.

And yes... it’s time for me to take my own advice. Meshtastic, etc. in Whatcom County, anyone? (Nearby Vancouver, British Columbia, Canada is a hotbed of MeshCore.)

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Test Bench In A (Handheld) Box

By Rudi Wiedemann K7RAW



Image courtesy of FNIRSI

If you've ever dreamed about having an electronics "test-bench-in-a-box", in my experience, the [FNIRSI DSOP350P](#) 4-in-1 comes closest. It's a 350MHz dual-channel digital storage scope with 1GigaSamples/sec resolution. It has a bright 7" color OLED touch display which allows you to drag your traces by finger as well as both the horizontal and vertical cursors with a readout of their positions in the corner. You change vertical scale with the "+" and "-" zoom buttons. You can freeze the sweep with the pause/play button. There are built-in measurement tools for the waveform displayed. A particularly nice feature is, besides the "screenshot" to an internal PNG file, is the ability to capture a "data shot" which lets you use the scope's tools to analyze a captured sweep at a later time using its internal browser.

You also get a Spectrum Analyzer that runs from 200KHz to 500MHz with zoom and measurement capabilities. Selectable FFT lengths from 4K to 32K are available. Basic 2D and 3D waterfall displays add a nice touch for moving signals.

Next up is the Frequency Response Analyzer which shows the logarithmic amplitude and phase over 3 decades logarithmically. (TIP: set your stop frequency at 10^4 times the start frequency to get "order of magnitude" values at the primary logarithmic sweep frequency points). Be sure to get a BNC "T" and some patch cables & adapters to make calibration and connection a snap.

Lastly, the waveform generator runs from DC to 50MHz including sine, square, triangle, sawtooth 1 & 2, step, half-rectified sine, full-rectified sine, exponent, ringing, square root, complex sine and sinc. All waveforms can be adjusted for frequency, amplitude, offset and duty factor.

A full charge using the USB-C port takes about 2 hours and lasts about 1.5 hours before it shuts itself off based on your preference. It comes in a nice semi-hard case with probes, function generator alligator leads and USB-C wall-powered pack. Next to my SV4401A VNA, this is my "go-to" analyzer as a perfect complement.

Editor's Note - K7RAW mentioned in a group chat that he has had extensive hands-on experience with this unit and he was impressed. Thus I was

intrigued, especially with the Spectrum Analyzer functionality (which I expect to have some use for in the coming months), and asked K7RAW for this brief article for the Zero Retries readership. There is no paid promotion in this article - neither the author or Steve Stroh N8GNJ / Zero Retries has any relationship with this vendor.

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My New 2025 Standby Battery Power System

By Steve Stroh N8GNJ

*My previous Amateur Radio station standby battery power system's battery died this past summer, and I decided not to replace it like for like (Absorbed Glass Mat - AGM or Sealed Lead Acid / Gel Cell), only to have an even more expensive 2025 version of such a battery die in another couple of years. This time I'd rather invest in a good system... and invest, I **did**. Please note that this is my personal choice of components / system / philosophy / price-performance. There are many other choices / systems / philosophies. I haven't seen many articles about 12 volt power systems other than basic "float charge a deep cycle lead acid battery, change it out when it dies" articles.*

*As I finished writing this, the old maxim of "a picture is worth a thousand words"... and the modern corollary "this would make a great video". Yes, it would... **will**... so consider this the script for a forthcoming video.*

Background on my 12 Volt Power System

While I don't consider myself an emergency communicator (at least for formal Amateur Radio participation), one element of emergency communications I have embraced is that I'd like to have a reasonable source of 12 volt DC emergency power for my radio desk to power the radios and at least a few computers.

To date, the batteries I've used in my 12 volt power system are reasonable quality Absorbed Glass Mat (AGM), otherwise known as Sealed Lead Acid / Gel Cell batteries. These are the type of batteries typically used in an Uninterruptible Power Supply (UPS) because they're reasonably safe - they don't generate dangerous hydrogen gas when being charged, they don't leak, thus they're safe for use indoors. But an AGM battery is basically Lead Acid batteries and thus, in standby / constantly float charged use, they last perhaps three years, similar to an automobile starter battery. Besides the "household safe" considerations, a major reason for using AGM type batteries *was* their reasonable cost. But my previous "reasonable quality" AGM battery cost between \$150 - \$200 (or more - I've forgotten). At that purchase, I resolved if I'm going to spend that much, when that battery died, I would get a LiFePO4 (Lithium Iron Phosphate) battery instead of an AGM battery. At that time, such batteries were easily 2x the cost of an AGM battery, but of course the price was steadily decreasing.

Another consideration for waiting for the *next* battery to be a LiFePO4 battery was that I required it to be very safe, very stable. From a previous job, I probably know a bit too much about how fragile and dangerous "Lithium" batteries can be. My power system, including the battery, would be sitting under a desk, in an unattended shop, for months and hopefully years. It would be mostly ignored until needed.

The primary feature I required out of a LiFePO4 battery is peace of mind that it would be safe... that I wouldn't find my shop engulfed in flames one night from a lithium ion battery fire.

I have yet to hear any bad reports about Bioenno batteries in use in Amateur Radio systems, and that was the deciding factor on choosing Bioenno as a battery vendor.

The Bioenno Power BLF-1240A



Bioenno Power BLF-1240A - Image courtesy of Bioenno Power

*I know there are cheaper and higher capacity “Lithium” batteries out there, including many 12V 100Ah batteries reviewed (and torn down) on YouTube. Again, this is **my** particular solution to standby 12 volt power for Amateur Radio use.*

These elements came together for me to choose the [BLF-1240A](#):

- I had already decided on Bioenno as a battery vendor because of their excellent reputation within Amateur Radio.
- Bioenno had a table at Pacificon 2025.
- The BLF-1240A was the largest 12 volt battery at the Bioenno table. *It was fortunate that I didn't choose a larger battery as it might not have been fully compatible with the charging solution I chose (max of 40A) - see below.*
- The price for the BLF-1240A, including an AC charger unit and a “big PowerPole to standard PowerPole” adapter cable, was reasonable.
- I had the funds available in my “Amateur Radio budget”.
- I was finally able to verify with the Bioenno staffer (unfortunately I didn't record his name) that I could replicate my previous “standby” system with this battery.
- It wasn't a factor in my purchase... but this is quite a testament to Bioenno's batteries:
The “BLF-” battery Products have a 20 year warranty from the time of purchase.
 Thus Bioenno's batteries are now my primary consideration for future “basic battery” units.

One of the key features of the Bioenno batteries is the built-in Protection Circuit Module (PCM) / Battery Management System (BMS) which manages the the charging and discharging of the battery, including load balancing the individual cells. All Lithium batteries have such a circuit, and because it's buried in the battery package, one has to trust the vendor that they built this circuit well.

One minor concern I have is the potential for charging the battery at low temperature (*as in, below 0° C, don't charge the battery*). But Bioenno says that their PCM / BMS protects for:

Overcharge, overdischarge, overcurrent, **temperature**, balancing.

West Mountain Radio Epic PWRgate

Similar to the fundamental choice of Bioenno as a LiFePO4 battery vendor, my choice of charging system vendor was West Mountain Radio (WMR). I've used their products for years and found them reliable, they know about and care about radio frequency noise being generated by their products, and they have developed an excellent reputation in Amateur Radio. Like Bioenno, WMR products aren't the cheapest, but I judge their price-performance to be

good.

With my previous standby 12 volt battery system, I was very happy using a [West Mountain Radio Super PWRgate PG40S](#) with the AGM battery. Within the lifetime of the AGM batteries, that unit worked exactly as advertised - basically a 12 volt Uninterruptible Power Supply.



West Mountain Radio Epic PWRgate Image courtesy of West Mountain Radio

I wanted to replicate that ease of use, but “float charging” is not that simple with a LiFePO4 battery. Fortunately, West Mountain Power also offers a LiFePO4 compatible charger - the [West Mountain Radio Epic PWRgate](#) (“Epic”) that is an improved version of the Super PWRgate PG40S, and was compatible with the BLF-1240A (could handle the maximum 40 amps of the BLF-1240A).

One very nice feature of the Epic, and in my opinion worth the minor increase in price (even if you don’t plan to use it immediately) is the solar panel power input port. Solar panels can provide variable power input (shade, clouds, etc.) and thus require special power circuitry.

But, the Epic isn’t going to be quite as “plug and play” / forgettable as the SuperPWRgate PG40S was. Some issues I’ll have to consider:

- The indicators on the Epic convey a *lot* more status information “at a glance” (see the [manual](#), Page 8), and with a LiFePO4 battery... *I care about “status”* (a lot more than with AGM), so I’m going to have to install the Epic in a visible location, not buried under the desk as I did previously.
- That the Epic can accommodate the output of a solar panel is worth consideration... except that my radio desk is at least 20 feet from an exterior wall (with reasonable solar exposure) where I could permanently install a solar panel.
- Because it’s compatible with a variety of batteries, the Epic has to be specifically configured for LiFePO4 batteries (which is an internal jumper setting, or more fine-tuned parameters via USB communications).
- I will have to adjust the AC power supply I use for charging to WMR’s recommendation of 14.5V.
- But the most significant new issue with the Epic is that it has a USB port for configuration / diagnostics / monitoring, and occasional *firmware updates*. And, the firmware update utility runs on Windows¹. This is only worth mentioning / considering because now, with the Epic, I will have to factor in a USB cable to one of the Windows computers on the radio desk (and mark it prominently which computer that’s used for the Epic)... which I probably would have done anyway to be able to view more detailed status available from the Epic.

The Most Puzzling, Frustrating Aspect - the Two Connectors on the BLF-1240A Aren’t Documented

Note that the BLF-1240A has two cables - one with an Amateur Radio standard Anderson PowerPole Red/Black connector, and the other with a large “industrial” Anderson PowerPole gray connector.

Nowhere in the online information on Bioenno’s website, or the [4-page manual](#), is the specific function / use of each of those connectors explained. Really - I’ve looked, closely.

There are two “clues” to the functions of each connector.

1. The included AC charger has a the Red/Black connector. Thus it’s a reasonable inference that the mating connector on the BLF-1240A is for charging.
2. On the web page for the BLF-1240A, there’s a line:
Discharge Connector: Anderson Powerpole (PP45 / SB50)

Both connectors are mentioned on that line (SB50 is the large gray one), but my key takeaway is that “Discharge” connector is *specifically* mentioned. If there’s a *Discharge* connector, ipso facto, the other connector must be the *Charge* connector.

So... thoroughly confused on how I would actually connect these two connectors with the Epic, I emailed technical support for both West Mountain Radio and Bioenno. To both company’s credit, the response was rapid... and the same.

Both connectors are connected in parallel on the BLF-1240A. There is no difference in function between these two connectors.

Argh!

Again, ***this basic... basic information is not mentioned... at all***, in the Bioenno manual or the Bioenno website.

And despite specific mentions of the Bioenno batteries in the Epic documentation, there is no mention of the use of which (or both?) connectors to use when connecting to the battery connector of the Epic.

Following this issue, I’ll email a strong suggestion to mention this basic (and I cannot imagine that it’s not...) *Frequently Asked Question* in their respective documentation.

As to why incorporate two connectors, with wildly different sizes?

West Mountain Radio's technical support explained (but Bioenno's did not) that the smaller Red / Black connector is good to 40 amps, and if you need larger current requirements, using the large gray "SB50" connector is recommended. With the BLF-1240A being able to supply 40A for 1 hour (40 Ah), it's almost a moot point to have the SB50 connector, but surely someone might need to use more than 40A, so in the interest of standardization with larger Bioenno batteries, including the SB50 makes sense. Logical, even, now that I have this basic understanding.

Power Budgeting

The longest term / system planning issue of the 2025 N8GNJ Standby 12 Volt Battery System is that the power budget is now 40 Ah. My previous AGM batteries were 100 Ah (rated... although I'm skeptical that I was ever able to really use that much capacity from those batteries).

But the BLF-1240A is **40 Ah**.

Which means, to have reasonable usability of my station solely from the BLF-1240A, I'm going to have to be a bit more frugal with my overall power budget. My electrical load needs to be $< \sim 20A$ to have a reliable 2 hours of operation, or $< \sim 10A$ for a reliable 4 hours of operation, etc. With the previous 100 Ah battery, basically I didn't worry about the electrical load. *Now* the electrical load is going to be pretty important.

One nice feature about the BLF-1240A is that it doesn't "care" if it gets fully discharged, and even stays discharged for an extended period. So I can use the full capacity of the BLF-1240A without worrying about damaging it or immediately recharging it.

One contingency plan for a longer duration power outage with my 2025 N8GNJ Standby 12 Volt Battery System (besides connecting a solar panel) is to have an easy-to-access method to provide auxiliary 12 volt power into the Epic in place of the AC charger. I have a number of 12 volt (battery) sources available and if it becomes critical to keep my radio systems online, I can simply connect those in place of the AC charger (despite the system's preference for 14.5 V) to recharge (or at least not further discharge) the BLF-1240A.

Add a West Mountain Radio PWRcheck+?



West Mountain Radio PWRcheck+ Image courtesy of West Mountain Radio

To help to fine tune the power budget, and to make my 2025 N8GNJ Standby 12 Volt Battery System "*downtown and deluxe*", I may add a [West Mountain Radio PWRcheck+](#) for an informative, easily readable realtime display of the overall electrical load that I'm expecting the battery system to support.

For example, I'll do some contingency planning of running some of the radio transmitters, in a typical usage scenario, at 50 watts, and at 25 watts. The difference in the power budget may be significant, or it might not. I'll have to do the actual testing to be able to tell.

Another "efficiency" issue is to do some load planning to see if it makes sense to update some of the Windows computers to newer more efficient units (some of which can use 12 volts directly) instead of those that require only 120 V AC and thus I have to use an inverter to power them.

Or... the PWRcheck+ may be an overcomplicating (and one more system to connect to a Windows PC and be able to update the firmware). The 2025 N8GNJ Standby 12 Volt Battery System will initially use the more modest inline [Powerwerx Watt Meter](#) which I'm using in my current system.

Don't Charge LiFePO4 Batteries $< 0^{\circ} C$

Despite the vast improvement in safety and usability of LiFePO4 overall, like other liquid lithium batteries, they cannot be charged (safely) when they're at low temperature such as (from Bioenno's manual):

One minor concern I have is the potential for charging the battery at low temperature (*as in, below $0^{\circ} C$, don't charge the battery*). But Bioenno says that their PCM / BMS protects for:

Overcharge, overdischarge, overcurrent, temperature, balancing.

Despite this protection in the battery... I'd rather the *charging system also "care"* about not charging a LiFePO4 battery at temps $< 0^{\circ} C$.

While it's not common that Bellingham, Washington, USA (CN88ru) gets down to $0^{\circ} C$, it does happen, perhaps 15 days per year. N8GNJ / Zero Retries Labs is insulated, and has minimal heating on really cold days, but again, the overriding goal of the 2025 N8GNJ Standby 12 Volt Battery System is safety, *safety, safety*.

Fortunately, West Mountain Radio has made provisions in the Epic for an (optional) external temperature sensor that can be attached to the battery:

[CBA Magnetic Temperature Probe Accessory - 58256-1020](#)

... which I've now ordered directly from West Mountain Radio.

Wrapping Up...

A few last bits and pieces about the 2025 N8GNJ Standby 12 Volt Battery System:

- One last reminder - this particular system, especially the choice of components (and the resulting costs) is my particular choice to meet my particular (perceived) needs.
- Mostly for visibility, I may end up building the system into a small rack for desktop usage.
- Something I haven't previously optimized is the length of distribution cables, and with the smaller 40 Ah battery, it seems worth optimizing the cables for minimal loss.
- With this more complicated system, I'm going to quickly forget details, so my poor sketches of my previous system will need to be a much better diagram of all of the elements of the system.
- The rudimentary steaming information available from the Epic (lines of text) might be just enough impetus for me to attempt to do some vibe coding for a Raspberry Pi Zero 2 W driving a small color, graphical display ... perhaps equivalent to the PWRcheck+. But unlike the PWRcheck+, the data being displayed will be generated from the *actual charging system* (the Epic) rather than "perceived" information external to the charging system.

I'll provide photos of the completed 2025 N8GNJ Standby 12 Volt Battery System in a future issue of Zero Retries, and perhaps a full diagram. I'll also offer a full cost breakdown of the total system once I have a full accounting of all the disparate elements of the system.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

[direwolf Release 1.8 Now Available](#)

John Langner WB2OSZ on the direwolf email list:

direwolf release 1.8 is now available in the default "master" branch.

Linux users should build from source in the usual way. If using an existing repository, do this first get to get the most recent release:

- git checkout master
- git pull

Windows users can download a pre-built version here: <https://github.com/wb2osz/direwolf/releases>

New Documentation:

- All APRS users should read [Understanding APRS Packets](#). Be sure to read the section on common mistakes or you might be used as an example of what not to do.

New Features:

- Added support for libgpod version 2. This is needed for GPIO PTT on [Raspberry Pi OS 13 trixie](#). You will need to install libgpod-dev before building.
- Support for CM108 PTT on Mac.
- New NCHANNEL feature to map a channel number to an external network TCP KISS TNC. See [APRS-LoRa-VHF-APRS-Bridge.pdf](#) for explanation and example.
- <http://www.aprs.org/aprs11/tocalls.txt> has been abandoned since the end of 2021. <https://github.com/aprsorg/aprs-deviceid> is now the authoritative source of truth for the vendor/model encoding.
- New direwolf icon.
- New direwolf icon is now embedded in the Windows executable. Note: When building from source, environment variable RC must point to windres location.
- Enhanced IGate functionality to allow downloading from all [CWOP](#) servers concurrently.

Sounds like some solid improvements to Dire Wolf (*Direwolf?* *direwolf?*) especially the support for RPi OS 13 Trixie and the CM108 PTT on Mac. Two stellar attributes of Dire Wolf are that it runs on (and is tested) on so many platforms, and that it's so well maintained and continuously improved.

Kudos to WB2OSZ!

IP400 (and More) News from ADRCS 2025-10 Newsletter

In the [2025-10 Alberta Digital Radio Communications Society \(ADRCs\) newsletter](#), there were some substantive updates on the IP400 Network Project.

IP400 Project Update

Martin Alcock, VE6VH

The development of the next generation of the mini node is under way, to enable outdoor deployments with higher power. A 3-board stack has been developed, with the addition of an ethernet controller which supports power over ethernet (POE) and is compatible with the previous power injector. A 5W power amplifier is being developed, which is the same that is being investigated by the M17 project, and a 9dB gain coaxial collinear antenna is included that was developed by Mike Martell, N1HFX. The node is encased in PVC tubing which can be purchased from any hardware store, and the antenna is built from RG58 coax. The board stack is pre-built, but the enclosure and antenna are not

With the ARDC grant in place, the development of the next generation digital controller is under way. We have decided to do this in two phases, the first phase will create a single board audio digital signal processor that can provide full repeater control or operate as a companion to an existing controller, which also adds a new enhanced digital mode based on the MMDVM-TNC project. The processor will take the form of a raspberry Pi HAT which augments the functionality of Allstar for linking and additional processing.

The second phase will be the development of the high speed OFDM modem, which connects to a raspberry Pi with a USB connection, which is required to achieve target data rates. The modem will accommodate the audio signal processor and provide the same functionality as in the standalone HAT mode, including the enhanced data mode and high speed modem.

A fallback version that will work in the 900MHz band is also being planned.

The MMDVM-TNC (multi-mode digital voice modem terminal node controller) was developed by Jonathan Naylor, G4KLX, as a next generation mobile digital mode. It is based on an adaptation of the DMR (Digital Mobile Radio) protocol, including more robust data transmission schemes that include forward error correction, and an improved layer 2 protocol called IL2P, developed by the Terrestrial Amateur radio packet network (TARPN). The native mode delivers 9600bps and can be adapted for repeater use. A prototype has been developed using hardware from Zum radio, and a code base is now in place. A companion TNC for mobile use will be announced in the future, which will build on the original work that was done but will provide a WiFi hot spot for a phone or tablet, as well as a KISS-compatible serial port.

M17 Project had hinted that the 5 watt amplifier for the LinHT was being developed with a partner organization, but the partner wasn't named (that I'd seen, prior to the IP400 presentation at ZRDC 2025). It's good to see that this amplifier will be used and promoted beyond the LinHT project.

Kudos to both teams on that project! The news of the 5 watt amplifier is really welcome. In addition to its use for IP400, availability of that unit off the shelf would improve the utility of Software Defined Transceivers operating in the 420-450 MHz Amateur Radio band.

Parsing out the above, I think the IP400 hardware progression being described is:

- Mini Node Next Generation, usable both standalone and integrated into the outdoor node,
- Digital Audio board similar to an MMDVM modem that will be used for repeater control and MMDVM-TNC (now tentatively named GTDATA),
- (Radio?) OFDM board that will enable additional high speed data modes
- TNC / Wi-Fi hotspot for mobile use
- Some products resulting from the above may be available from [ZUMRadio](#).

In addition to the amplifier being welcome news, the attention from the IP400 team on MMDVM-TNC / GTDATA is also welcome. That project has tremendous potential for significant improvement of packet radio technology from the integration of a more robust waveform (based on DMR), higher speeds, and integrated Forward Error Correction (IL2P). As previously mentioned, I'll be working with Jim McLaughlin KI6ZUM of ZUMRadio to evangelize and showcase GVDATA in 2026, including putting together some demonstration systems in N8GNJ / Zero Retries Labs.

Kudos to the IP400 team for this progress!

Thought Experiment - Could OpenGD77 or MMDVM Be Configured for Single Channel or Four Timeslots DMR?

Every month or two, Brian Webster N2KGC and I get on the phone with each other to compare notes on Zero Retries Interesting topics... and magically an hour vanishes before we know it.

N2KGC and I know each other from our involvement in the early Wireless Internet Service Provider (Fixed Point to Multipoint) industry, as well as being involved in Amateur Radio Packet Radio in its formative years... so we have a common frame of reference for our discussions.

N2KGC shares my interest in the potential of modified DMR repeaters to:

- Operate on a single channel by using one of a DMR Repeater's Time Slots to receive, and the other to transmit.
- Transfer arbitrary data instead of only digital voice (with, perhaps, ancillary data such as Motorola and Hytera have implemented).

In this most recent conversation, N2KGC suggested that perhaps a DMR repeater, "conventionally" using different input and output frequencies, could be partitioned into *four* timeslots:

1. Frequency A, Timeslot 1

2. Frequency A, Timeslot 2
3. Frequency B, Timeslot 1
4. Frequency B, Timeslot 2

Perhaps Frequency A could serve as the user access, with Timeslot 1 being the repeater's input, and Timeslot 2 being the repeater's output.

It gets interesting to consider using Frequency B's two Timeslots for inter-repeater (or other node) linking.

When I protested that DMR repeaters seem to be pretty "fixed function", N2KGC suggested that [OpenGD77](#) open source firmware can change user functions of some DMR radios. Depending on how "deep" OpenGD77 can access the functions of applicable DMR radios, perhaps some of the fundamental functions of a DMR radio could be changed, such as the four timeslot configuration outlined above, or even using DMR for arbitrary data.

There's also the possibility of reconfiguring DMR through the use of MMDVM which is open source software that also supports DMR. Thus perhaps MMDVM could be modified to implement the four timeslot configuration, especially with full duplex MMDVM units.

N2KGC and I certainly didn't figure anything out in this most recent chat session... but it was fun to imagine some of the possibilities between us.

See Also:

[OpenGD77 Firmware: Why Ham Radio Operators Are Switching Their DMR Radios](#)

I was glad to see this article, because I consider myself one of those who found the user interface of typical DMR portable radios... inscrutable. OpenGD77 sounds like it's well worth a try.

[44Net VPN Status Update](#)

On the Ardc | Net-44-Vpn email list:

Mickey Kappes K06DOT:

Is the 44net VPN Beta open to additional testers? How is the beta going?

John Burwell KI5QKX:

The team has been working all year to get ready to open it up to more users by the end of November. Not making any promises, but right now we are looking good! I want to write a getting started doc or two, and we have a couple of technical questions to resolve.

Heads up that tomorrow I will be sending a note about the upcoming testing party on November 5, where current users will have a chance to put the latest code through its paces.

[Introducing the Next Generation of AllScan USB Radio Interfaces](#)

David Gleason NR9V on the Facebook AllScan AllStar App & Nodes group:





AllScan URI125. Image courtesy of AllScan.info



AllScan URI160 Image courtesy of AllScan.info

The highly-innovative URI125 and URI160 greatly expand the features and flexibility of the AllScan URI product line. I received prototypes

for these on Monday and they are working perfectly. Still have a couple days of testing to complete checking out all functions, will then have a very small number available for sale, and full stocks within 2 weeks.

The URI125 replaces both the URI101 and URI110 - combining all functions of both while adding several additional new features including a User-configurable 3.5mm TRRS I/O jack, switch-selectable 10dB gain Tx audio amp, optocoupled solid-state PTT relay, and switch-configurable Mini-DIN-6 jack supporting simultaneous use of the Mini-DIN and K1 jacks for separate Rx and Tx radios/connectors.

The URI160 takes the level of innovation even further - combining all features of URI125 and URI141 while adding a built-in USB hub and UART bridge, serial port functionality supporting PTT/COS for dozens of apps through serial control lines (RTS/CTS/DCD/DTR/etc.), a Digirig-compatible 3.5mm TRRS Serial Data jack, and support for HT programming and radio CAT control. The URI160 also features 6 tri-color front-panel LEDs providing comprehensive status information.

Initial price on the URI125 will be \$79 and the URI160 will be \$119. As the URI125 will be replacing the URI101 and URI110 I am now offering \$10 off on remaining stocks of those URIs (now only \$59) - mention this post when placing your order and stay tuned to <https://allscan.info/>

Additional technical detail in the comments on that post:

Tom Bach:

Looks awesome David.....you keep cranking them out! Quick ?, was the +10 dB amp put in for the instances where the 6 pin radio data jack is used? I've noticed the TX audio can't quite generate enough audio when that is used. Would be nice to be able to "turn it up" a little 😊.

David Gleason:

Hi Tom, the 10dB Tx gain option was added because some ASL nodes have fairly low IAX audio levels eg. -10dBFS, thus even though the CM108B IC can output 3Vpp, ASL will not always have a full-scale output and thus radios that need 2Vpp on the modulator input might see somewhat less than that. There are ways to compensate for that in ASL, and I'm in the process of adding a Tx AGC function to better support URIs that don't have extra gain, but the +10dB gain option makes it very easy to get higher output levels if need be. Schematics are included in the pics on this post. Total for a URI125 is \$79 + \$6 USPS = \$85, which can be paypal'd to david at allscan.info. On these first prototypes though I can do \$10 off because there are a couple things I will be making some minor adjustments to in the next board run which I'll have in about 2 weeks - I will be adjusting the LED brightness a bit, and the Level trim pots on the front panel are reversed (CCW=100%), but those are pretty minor details.

AllScan continues its rapid pace of iteration and innovation, and really good price / performance. Keep in mind that these audio / radio interfaces aren't just for use with Amateur Radio Internet linking such as AllStarLink, but equally usable for audio interface modes such as VARA FM.

I'm glad to see multiple, informative status blinkenlights return, if for no other reason than the nostalgia of the Packet Radio TNC era.

Surrey Amateur Radio Communications The Communicator Newsletterzine - November December 2025 Issue

John Schouten VE7TI (Communicator Editor) via email notification:



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Here is an experimental [video overview](#) of the 2025 Communicator issues and also an [audio overview](#).

You can even search the issues or ask questions!

Welcome to the [November-December 2025](#) edition of the SARC Communicator, your go-to guide for all things amateur radio in our vibrant

RF neighborhood. This edition is a journey across the history, innovation, and fascinating activities of amateur radio.

As we transition from crisp fall days to the festive glow of holidays ahead, this issue looks at the enduring legacy of Émile Baudot, the pioneer of digital communication, and revisits the vital role of radio during the catastrophic 1917 Halifax Explosion.

For satellite operators, discover how to seamlessly integrate SkyRoof with the Icom IC-9700 for LEO satellite operations, and check out our review of the past year in amateur satellites.

Technical articles dive into RTTY as a viable emergency digital mode and explores the fascinating use of radio telemetry in insect tracking. We also have several articles on a current 'hot' activity, homebrew vertical antennas for Parks on the Air (POTA). Finally, catch up on the excitement of the ARDF World Championship and a glimpse into the future of Software Defined Radio.

There are articles for all levels of amateur radio and you're sure to find something of interest.

Dive in for inspiration, connections, and the pulse of what makes our hobby of hobbies special. A special year-end thank you to our contributors and columnists. On behalf of SARC and SEPAR, we wish all of you a safe and happy holiday season.

Stay engaged—our readership powers us forward!

Enjoy this final issue of 2025!

My Zero Retries column - **Imagining the Future of Software Defined Amateur Radio**, is on pages 76-79. This issue of The Communicator is 122 pages!

[FutureGEO Workshop Memo](#)

Michelle Thompson W5NYV on the Open Research Institute website:

See <https://gitlab.com/amsat-dl/futuregeo> for more information and the most recent version of this memo.

A FutureGEO Project Workshop was held 19 September 2025. The event was organized by AMSAT-DL with sponsorship and support from the European Space Agency (ESA). The workshop was immediately before AMSAT-DL's Symposium and Membership Meeting, which was 20-21 September 2025.

This article is a good summary of the discussion and scoping work that occurred at this conference.

Go, (Amateur Radio) GEO, Go!

[SDR-Hub: A New RTL-SDR Scanner and Audio Recorder with Web Interface](#)

RTL-SDR.com:

Over on GitHub, user shajen has recently released a new open source program called "[sdr-hub](#)," which combines his two prior programs, called rtl-sdr-scanner-cpp and sdr-monitor, into one easy-to-launch project. The result is a powerful RTL-SDR scanner and audio recorder, with a web interface. In the past, [we posted](#) about rtl-sdr-scanner-cpp when Tech Minds made a video on it.

The scanner feature allows users to scan for active frequencies across a wide spectrum by rapidly retuning the RTL-SDR. If the transmissions are all within the same instantaneous bandwidth, the user can also record the audio.

The web interface then allows users to easily browse any created spectrum graphs and play back any audio recordings.

The software is available as a Docker image, making it easy to install and run.

[Trials & Errors #67 \(10/10/25\): Defending the Spectrum](#)

Dave Jensen W7DGJ on his QRZ.com column:

David Siddall [K3ZJ] has been serving the ARRL as its Washington Counsel since 2019, through DS Law which he founded in 2011. He's the perfect source for this topic, as his work has involved spectrum management going back to key roles he had at the FCC. At that agency, K3ZJ served a variety of positions over the years, including as Chief of the Spectrum Policy Branch and Legal Advisor to a Commissioner for wireless, technology, and international matters. At the time he was the only licensed ham serving as Commissioner-level staff. I enjoyed a meeting with Dave last month, and during that call learned a great deal about the various stress points in the spectrum held by amateurs.

...

Still today, a lot goes on that we don't read about, but the ARRL is constantly connected to those who determine spectrum use both domestically and internationally." The league has also achieved international successes through the work of Jon Siverling [WB3ERA]. Dave told me that John works exclusively for the ARRL and is an expert in ITU and its associated WRC matters. WB3ERA handles the international spectrum issues that continually surface to endanger the amateur spectrum bands, including many that have been nipped in the bud.

As a former Washington lobbyist who worked with legislators for a decade on a variety of cutting-edge wireless and spectrum issues, Dave has the kind of clout necessary where there are requirements both in technical radio expertise as well as a savvy knowledge of the inside workings of the governmental agencies that affect spectrum matters. As we all know, things are quite polarized now politically, and the ARRL has quite a job to stay neutral on political matters while working with those on both sides of the aisle to protect amateurs' interests. Dave not only has worked for both sides in his professional civil service capacity, but has held political appointment staff jobs for both as well.

This is a great interview by W7DGJ that confirms my already good impression of K3ZJ from his filings on behalf of ARRL and Amateur Radio with the FCC. I'll have more to say about this in a future issue of Zero Retries, but despite my misgivings about the politics of the ARRL, I've decided to remain a

(paid) member of ARRL, largely because of my respect for K3ZJ's excellent work with the FCC in the past couple of years.

[Pacificon 2025 Overview](#)

Michael Rickey AF6FB on his blog:

I attended Pacificon this year. My primary role was in the MMDVM booth answering questions about the MMDVM Project. I also learned about some interesting products and projects. This is the goal of this post, to share these things with you.

I enjoyed AF6FB's perspective as he spotted several of the same Zero Retries Interesting things that I did, including a bit more in-depth about what was being presented at the MMDVM booth.

[MMDVM 2025-10 Update](#)

Michael Rickey AF6FB on the MMDVM website:

It is October and here is our update. In this report we will talk about our current initiatives and our status on them. If you have questions you are welcome to reach out to the team either here or through the OpenDV Groups.io list.

- I/Q Radio
 - As the ADF7021 gets closer to end of life we have been working with ZUM Radio to evaluate a new option.
 - In our goals for our current grant we mentioned the SX1255, AT1846, CC1200, and the WL33 chips as possibilities.
 - ZUMRadio created boards for the AT1846, CC1200, and WL33 for evaluation at no cost to MMDVM.
 - ZUMRadio's evaluation of the AT1846 and the CC1200 showed these chips are not stable enough for our uses. They were abandoned.
 - The WL33 was evaluated by ZUMRadio and by an outside developer (Martin Alcock) that has experience with the WL33. MMDVM paid Martin for this work. We have decided STMicro has not built support for what we need to do.
 - For the SX1255, ZUM Radio has created test boards for software development – work on the driver code is being done at no cost to MMDVM. We showed this board sending different modulations at Pacificon 2025.
- TNC Mode
 - This work is complete and the source code is in the MMDVM GitHub (<https://github.com/g4klx/MMDVM-TNC>) repository. It is being used by people now and is the subject of a talk at the Zero Retries Conference (<https://www.zeroretires.org/p/conference>) in September.
 - MMDVM will support this as needed and resolve issues as reported.
- Transcoder and Cross-Mode operation
 - This topic contains two of the original goals. Using a prototype board, developed and donated by ZUM Radio, we have this working now.
 - When a production candidate becomes available we will do final integration work as needed. The plan is to implement this as a USB dongle type device that can be connected to a hotspot through the USB interface.
 - The final product may be implemented with a single AMBE3003 or two ABME3000 chips. The current software supports either option. The final decision is up to ZUM Radio.
 - Source code is available in the MMDVM GitHub repository (<https://github.com/g4klx/MMDVM-Transcoder>)
 - PCB design and Gerber/BOM files are available at https://github.com/ZUM-Radio/MMDVM_transcoder_hw
 - This is a feature users can manually configure now, while we wait for it to be implemented in WPSD and Pi-Star.

There's much more detail - see the link in the title.

To heap some praise on AF6FB for his writing on behalf of the MMDVM project... *this is an excellent example on how to do a (monthly, at minimum) status update on an ongoing project!*

Provide an overview with bullet points, some reasonable detail, and include links for those that want to really drill down for granular detail.

After reading this, I felt updated on the progress of MMDVM.

One minor correction - at ZRDC 2025, we (me) would have loved to have had a presentation about "TNC Mode" (AKA MMDVM-TNC, hopefully to be renamed DVDATA) or even done one myself. But, the schedule filled up quickly and I deferred a presentation about DVDATA in favor of highlighting other data modes such as AREDN and IP400, though I did mention DVDATA in my keynote presentation.

[Announcing The 2025 Hackaday Superconference Communicator Badge](#)

Elliot Williams on Hackaday:

It's the moment you hard-core hardware nerds have been waiting for: the reveal of the [2025 Hackaday Supercon Communicator Badge](#). And

this year, we've outdone ourselves, but that's thanks to help from stellar collaboration with folks from the community, and help from sponsors. This badge is bigger than the sum of its parts, and we've planned for it to be useful for you to hack on in the afterlife. Indeed, as always, you are going to be the final collaborator, so we can't wait to see what you'll do with it.

We're going out – wide out – on a limb and trying to create a dense mesh network of badges talking to each other at Supercon. It's going to be like a badge-hosted collection of chat rooms, as connected as we can make them without talking over each other.



You look up a topic, say Retro Computing or SAO trading, punch in the channel number on the numpad, and your badge starts listening to everything going on around that topic. But they also listen to everything else, and repeat anything they hear on to their neighbors. Like IRC, but LoRa.

As I said, Meshtastic and LoRa is now present at every technology conference.

Explaining the Mesh! - MESHCON 2025: Daniel Susca Opening

Join Daniel Susca from our team at MEHSCON as he dives into the mesh! In this talk, Daniel explains the differences between Meshtastic, Meshcore, and Reticulum, ISM and LoRa technology, and centralized vs decentralized networks.

Looks like an interesting presentation, added to the (too long, sigh...) queue.

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Comments Summary From Previous Issue

Comments from Zero Retries 0225:

- GNU Radio Discord and Matrix links.
- Ukraine's exponentially improving radio technology.
- Comment on legacy TDMA technology.
- VR-N76 and similar radios are breaking open portable packet radio.

To receive new issues of Zero Retries every week via email, become a free subscriber. To support Zero Retries, paid subscriptions are appreciated, *but entirely optional*.

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Zero Retries Boilerplate

The [Zero Retries Store](#) is now open for business with quality Zero Retries branded merchandise and items being retired from Steve's N8GNJ Labs.

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing *Thanks* to:

Tina Stroh KD7WSF for, well, *everything*!

Jack Stroh, Late Night Assistant Editor Emeritus

Shrek Stroh, Late Night Assistant Editor In training

Annual Founding Members who generously support Zero Retries financially:

Founding Member 0000 - Steven Davidson K3FZT (Renewed 2025, *3rd year!*)
Founding Member 0001 - Randy Smith WU2S (Renewed 2025, *3rd year!*)
Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2025, *3rd year!*)
Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2025, *3rd year!*)
Founding Member 0004 - William Arcand W1WRA (Renewed 2025, *3rd year!*)
Founding Member 0005 - Ben Kuhn KU0HN (Renewed 2025, *3rd year!*)
Founding Member 0006 - Todd Willey KQ4FID (Renewed 2025, *3rd year!*)
Founding Member 0007 and 0010 - Merik Karman VK1DF / VK2MKZ (Renewed 2025 x2, *3rd year!*)
Founding Member 0008 - Prefers to Remain Anonymous 08 (Renewed 2025, *3rd year!*)
Founding Member 0009 - Prefers to Remain Anonymous 19 (Renewed 2025, *2nd year!*)
Founding Member 0011 - Rick Prelinger W6XBE (Renewed 2025, *2nd year!*)
Founding Member 0012 - Ryan Tolboom N2BP (Renewed 2025, *2nd year!*)
Founding Member 0013 - Newton White N4EWT (New 2025)
Founding Member 0014 - Joe Hamelin W7COM (New 2025)
Founding Member 0015 - Rich Stocking N7OP (New 2025)
Founding Member 0016 - Prefers to Remain Anonymous 77 (New 2025)
Founding Member 0017 - Phil Karn KA9Q (New 2025)
Founding Member 0018 - Prefers to Remain Anonymous 95 (New 2025)

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Keywords for this Issue

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44Net VPN, AllScan, **Amateur Radio**, AMSAT, Bioenno Power BLF-1240A, **Data Communications**, **Digital Communications**, **Digital Voice**, direwolf Release 1.8, **DV**, FutureGEO, Hackaday, **Ham Radio**, LiFePO4 Batteries, LinHT, Linux Handheld Transceiver, MESHCON 2025, MMDVM, **N8GNJ**, OpenGD77, **Packet Radio**, **Radio Technology**, **Software Defined Radio**, **Software Defined Receiver**, SARC, SDR-Hub, Superconference, **Steve Stroh**, Surrey Amateur Radio Communications, West Mountain Radio Epic PWRgate, **Zero Retries**, **Zero Retries Digital Conference**, **ZRDC 2025**

*Keywords in **Bold** are regular mentions in each issue.*

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1](#)

In mentioning that the firmware update utility for the Epic is Windows, I'm not complaining or making this an issue. I understand West Mountain Radio's choice to do so. Please don't kvetch about Windows versus other operating systems.